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# COALS OF KANSAS.

BY WILLIAM H. SAUNDERS.

At the request of Secretary Parker, I have condensed in the following paper the results of some chemical investigations, which I have from time to time made, of the quality of our Kansas coals.

Up to this time, so far as I know, no true bituminous coal has been found west of the Missouri river, and probably none exists.

Many valuable beds of coal, some of which are many feet in thickness, occur throughout the western part of the country, but all belong to that class of coals called lignites. On a close examination of the most compact, homogeneous specimens, laminæ of a soft, black, pulverulent substance like charcoal, retaining its original organic structure can be found, which assign them to the class of lignites.

In Kansas all qualities are found, from the soft, brown, woody lignite, destitute of bituminous matter, and showing plainly the original vegetable structure, to that so highly bituminized and homogeneous in quality, as to approach very nearly a true bituminous coal.

The general distribution, good quality, and easy access of our coal beds render it highly probable that in years to come Kansas may be made commercially independent, by the possession of a cheap means of preparing for use the crude products of the vast and varied industries that her fertile soil and varied resources are capable of sustaining.

The eastern half of the State lies on the western border of the great interior coal basin of the continent, where the outcrop of the strata would bring the coal to the surface. Owing to the very slight disturbance of the strata in this part of the west, they lie nearly horizontal, having a slight dip to the northwest and north, thus insuring the distribution of coal over a large area, and greatly facilitating mining operations, for, when once a bed is reached, the miner can work in any direction with no prospect of having his progress impeded by a fault in the strata.

At numerous places throughout the eastern half of the State, thin beds of coal of the upper coal measures outcrop along the hillsides, but the thickest and best beds yet discovered outcrop in the lower coal measures of the extreme southern part and below.

As the dip of the strata is so uniform, and thick beds are generally continuous over a large area, an estimate can readily be made of the approximate depth it will be necessary to go at any point to reach them. Upon such a basis work was commenced in the shaft at Leavenworth, and coal reached at about the depth anticipated, although not of as great thickness as was expected.

In the northern part of Bourbon county, and from thence in a line northeast and southwest, outcrops a fine stratum of coal about thirty inches thick, called the "Osage vein," but generally known throughout the State as Fort Scott coal. This appears in commerce under two names, black and red ; names derived from the external appearance of the lumps, the real difference in quality, if any, being in favor of the black. It contains a large amount of bituminous matter that furnishes abundantly a gas of high illuminating power. The amount of ash and sulphur it yields is a little larger than some other coals yield, but this does not detract materially from its superiority over most of them for general use. The coke from it is firm, but does not possess the body of coke from the best eastern coals

Farther south, in the center of Cherokee county, outcrops another stratum of coal six feet thick, that also stretches northeast and southwest, and is of finer quality than the preceding. For the production of gas and heating purposes it is the best coal in the State, the only drawback being a tendency to run together into a solid coke in the furnace, which, however, by a little attention, can be readily prevented. It yields a much larger quantity of illuminating gas than the Fort Scott coal, of equal quality, gives a coke of more body and heating capacity, less ash, and but little more sulphur. The Lawrence and Kansas City gas companies, after a thorough trial, pronounce this the best coal for the manufacture of gas that they can obtain from Kansas or Missouri.

The Leavenworth mine furnishes a fine, compact coal of greater heating capacity than the Fort Scott, but not equal to the Cherokee. It is not as rich in bituminous matter as the Fort Scott, and contains a decidedly larger percentage of sulphur that causes it to "clinker" badly.

These three are the best and leading coals of the State. Besides these, only two other fields are worked to any extent ; one, the Osage county field, stretching from Carbondale to Osage City ; the other at Grayville, Franklin county. These are of about the same quality, from twenty-four to thirty inches in thickness, yield a small amount of illuminating gas of fair quality, a moderate per cent. of sulphur, a large per cent. of ash, and coke of inferior quality. These two coals, however, in one respect are superior to the others. They do not give a heavy coating of soot to everything in contact with their smoke, but burn clean, a fact which will recommend them strongly for use in the kitchen where utensils are frequently handled.

With increased railroad facilities the demand of the greater portion of the State will, without doubt, be supplied from the fields already mentioned.

No good coal has yet been found in Western Kansas. A few years ago a heavy bed of brown coal or pure lignite was worked at Wilson's creek, on the K. P. Railway, that in time may become valuable in that region so scantly supplied with fuel. It is notable for containing less sulphur than any other coal which I have seen in Kansas.

For use in metallurgy all our coals contain too much sulphur, and will require coking.

In the following tables are given the results of the chemical analyses which I have made of coals from Kansas and other parts of the west:

| | KANSAS COALS. | | | | | COLORADO COALS. | | | | | | MISSOURI. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Wilson's Creek, K. P. R. W. | Carbondale, Osage county. | Coal Creek, Douglas county. | Lawrence Mine, Franklin county. | Fort Scott. | Marshall's Vein. | Golden City. | Kiowa. | Bijou Creek. (Cannel.) | K. P. R. W, | K. P. R. W. | Camden. |
| Water | 7.50 | ........ | 11.53 | 11.00 | 15.90 | 8.08 | 10.00 | 7.70 | 13.00 | 11.00 | 13.00 | ........ |
| Combustible Gases, cubic feet per pound | 2.33 | 3.00 | 2 29 | 2.35 | 3.04 | 0.30 | 1.79 | 4.01 | 1.81 | 1.64 | 1.40 | 3.50 |
| Illuminating power | low | high | high | high | highest | very low | fair | none | fair | low | none | high |
| Amount of Tar | small | medium | small | medium | medium | small | small | small | small | large | small | small |
| Sulphur | 1.63 | 3.70 | 3.69 | 3.45 | 4.10 | 1.95 | 2.60 | 2.46 | 2.21 | 1.50 | 0.89 | 3.59 |
| Coke | 68.75 | 69.03 | 62.50 | 59.89 | 66.15 | 75.60 | 58.86 | 48.44 | 55.54 | 52.00 | 52.34 | 53.91 |
| Ash | 9.50 | 12.31 | 5.25 | 9.20 | 12.05 | 3.00 | 4.46 | 10.28 | 5.50 | 6.18 | 17.50 | 12.00 |
| Rate of combustion in open air | fast | slow | medium | slow | medium | slow | medium | slow | fast | medium | medium | medium |
| OR : | | | | | | | | | | | | |
| Volatile Matter | 31.25 | 30.97 | 37.59 | 40.11 | 33.35 | 24.40 | 41.14 | 51.56 | 44.46 | 48.00 | 47.66 | 46.09 |
| Fixed Carbon | 59.25 | 56.72 | 57.25 | 50.69 | 54.10 | 72.60 | 54.40 | 38.16 | 50.04 | 45.82 | 34.84 | 41.91 |
| Ash | 9.50 | 12.31 | 5.25 | 9.20 | 12 05 | 3.00 | 4.46 | 10.28 | 5.50 | 6.18 | 17.50 | 12.00 |
| | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

From this table it will be seen that a marked difference exists between the coals of Kansas and those to the west of us. Sulphur diminishes to so small an amount westward, that the coals can be used in the raw state for metallurgy. The amount of volatile matter increases, but this is chiefly hydrogen with little or no illuminating power. The fixed carbon and the ash diminish.

Of those that I have analyzed, and others that I have seen, none are, I think, equal for general use, to our Cherokee coal.

One given in the table, Marshall's vein, differs in a marked degree, from all others. Its output is on South Boulder creek, at the base of the mountains near Denver, embracing a series of eleven beds that vary from five to thirteen feet in thickness. In appearance like anthracite, having a bright lustre, homogeneity of structure, leaving no stain when handled, containing but a slight amount of volatile matter, one is tempted, at first sight, to pronounce it anthracite, but an occasional thin lamina of pulverulent, carbonaceous matter shows that its place is among the lignites. Not the least item of interest is the small per cent. of sulphur in its composition, an amount that will not interfere with its use in the raw state for the working of metals. For all purposes, except the production of gas, this coal is the best of which I have any knowledge in the west.

The coal from Bijou creek is chiefly cannel coal, but does not contain the amount of bituminous matter usually found in this variety, which, elsewhere, is the most valuable of all for the production of illuminating gas.